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CREATION OF A FRAMEWORK FOR PUBLIC HEALTH INTERVENTION DESIGN

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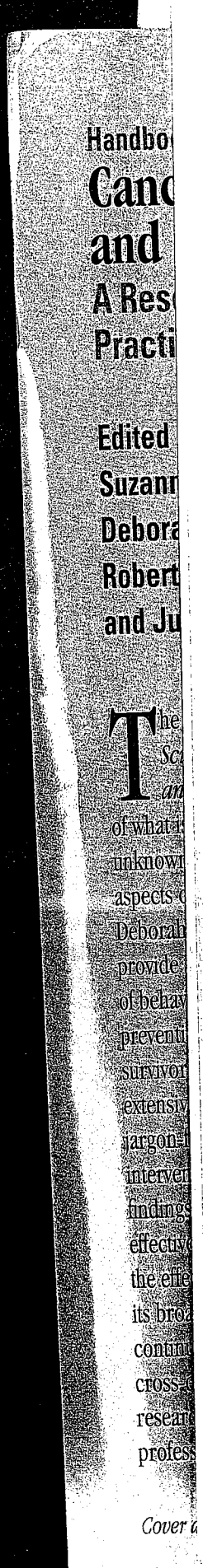
This chapter describes our application of Weiner's (1995) three-step process to develop an evidence-based theoretical framework for public health intervention design. Our first step was to read the literature on the use of health behavior and health behavior change theories and models in designing interventions. We focused on those theories and models that have been used to design published interventions and that have empirical support. Through this consideration, we identified a relatively small number of common variables that consistently predicted health behavior change and represented key research findings. Next, we ordered these variables into an initial framework, or classification system. We present this framework in this chapter. Our third step, actively applying this framework to intervention settings by measuring constructs in the intervention over time and using these measures to predict change in health behavior, will be conducted in future research programs. The organization of this chapter follows these three steps First, we discuss existing theories and their usefulness for intervention design. Then we combine these models into a single model, identifying commonalities among the models. Finally, we suggest future directions for research.



Individual-Level Theories

Investigators can choose multiple individual-level theories from which to choose when designing a framework for behavioral intervention. The idea behind the use of individual theories is that people make choices about health protection and health behaviors because of specific motivations, often thoughts or feelings. Understanding these thoughts and feelings and ultimately changing them in the appropriate directions will cause individuals' health behaviors to change as well.

Health belief models, like the original Health Belief Model are the most widely used in intervention design. The original formulation of the Health Belief Model in health promotion and disease prevention research addressed threat (i.e., perceived susceptibility and perceived severity) and outcome expectations (i.e., perceived benefits and perceived barriers). Other models were developed in response to the original Health Belief Model. One such example is the Protection Motivation Theory (R. W. Rogers & Mewborn, 1976), a cognitive theory (i.e., value expectancy theory) that posits that behavior is influenced by a person's subjective value of the outcome and by his or her subjective expectation that something he or she does will result in the desired outcome.

The Theory of Reasoned Action (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975) explains individuals' health behavior as a function of their intentions, attitudes, and beliefs regarding health behavior, including nonhealth beliefs and beliefs about the social influences exerted by others. The Theory of Planned Behavior (Ajzen, 1991; Ajzen & Madden, 1986) builds on the Theory of Reasoned Action by adding to the model perceived behavioral control over the ability to perform the health behavior.

The Self-Regulation Model (Leventhal & Cameron, 1987; Leventhal, Diefenbach, & Leventhal, 1992) adds affect and the emotional response to the health problem as predictors in the equation. The Transactional Model of Stress and Coping, a cognitive behavior framework for addressing health promotion and disease prevention, describes a person's interaction with stressful environmental events through an appraisal of the stressor and its management, resulting in adaptation to the situation (Lazarus, 1991, 1993; Lazarus & Folkman, 1984).

The Transtheoretical Model of behavior change and the Precaution Adoption Model both hypothesize that people make changes in their health habits gradually, using different processes of change at different times and progressing through predictable stages of change (Prochaska & DiClemente, 1982, 1983; Weinstein, 1993). In addition, people in different stages of change perceive the pros and cons of changing their health behavior differently.

Miller, Shoda, and Hurley's (1996) Cognitive-Social Health Information Processing model goes beyond other models of behavior change in that it specifies characteristics of the individual, characteristics of the messages, and the basic elements of process among intermediate variables to explain and ultimately change behavior. Individuals who monitor their health and symptoms need more information, more attention, and more explanation than do those who simply want to move through an illness without observing and attending to its details and its associated symptoms and issues. A complex interplay of mechanisms is proposed to account for these differences, and this model has been used successfully in intervention design and evaluation to produce behavior change (Miller, Fang, Manne, Engstrom, & Daly, 1999; Miller et al., 1996).

Experimental psychology has contributed multiple theories of how individuals learn new behaviors to the design of health behavior interventions. The methods and strategies used in intervention research incorporate behavior modification and basic principles of conditioning (e.g., reinforcement; Abrams, Emmons, & Linnan, 1997; Pascale, Wing, Butler, Mullen, & Bononi, 1995; Redmon et al., 1999). According to social learning theory (Bandura, 1986, 1997), two basic belief systems drive behavior: *self-efficacy*, or the belief that the person has the resources to attain a proposed goal, and *outcome efficacy*, or the belief that the proposed goal is worth attaining. Indeed, values and goals represent a key, but understudied, component of decision making and behavior change in cancer risk and disease (Miller et al., 1996).

Community- or Group-Level Theories

Increasingly, there is recognition that a lifestyle behavior takes place in a complex web of formal and informal policies and actions that reflect a community's rules of conduct (Aarts, Paulussen, & Schaalma, 1997; Cohen, Scribner, & Farley, 2000; Thompson & Kinne, 1998). Community approaches to health behavior change have the potential to reach large numbers of people, to become widespread within a community, and to foster sustainability of behavior change as a particular behavior becomes normative in the community.

Ecological perspectives are specific about the influence of the environment: Behavior is greatly influenced by the social, cultural, and physical milieu within which individuals operate (McLeroy, Bibeau, Steckler, & Glanz, 1988; Stokols, 1992). Key concepts of theories within this perspective include (a) health is influenced by the social, physical, and interpersonal worlds; (b) environments are extremely complex, multidimensional, and difficult to measure; (c) environments can have many levels of aggregation from families to populations; and (d) there are reciprocal processes between the different levels of the environment. A specific example of an ecological model is the Diffusion of Innovations model. *Diffusion* is the process by which an innovation

is communicated through certain channels over time among the members of a social system (E. M. Rogers, 1995). The *innovation* refers to an idea, practice, or object that is perceived as new by an individual or other unit of adoption.

The community organization approach (Minkler & Wallerstein, 1997; Rothman, 1979, 1996; Thompson & Kinne, 1998) includes four core constructs: (a) Community members must be engaged in problem solving (i.e., community participation); (b) all components of a community must be understood prior to any intervention (i.e., community analysis); (c) a process of intervention in which communities and their citizens gain control over their own problems should be used (i.e., empowerment); and (d) communities can be stimulated to take action toward solving their problems (i.e., mobilization). Community organization focuses on changing community structures, redistributing community resources, and instituting policies to ensure long-term change (Thompson et al., 1995).

Coalition building as a means to community change has received some attention (Carrell, Johnson, Stanley, Thompson, & Tosti, 1995; Salonen, Puska, Kottke, & Tuomilehto, 1981). A key assumption behind the coalition approach is that coalitions can have sufficient power to reach all community sectors and change community policies and norms. In the health field, coalitions are formed when diverse organizations within a community come together to address community health (National Cancer Institute, 1991; Pertschuk & Shopland, 1989). Community development theory has many similarities to a community organization approach. Historically, however, the main focus of community development is a community's economic development (Van Willigan, 1976). A secondary focus is in the area of education, seen as the key by which communities become stable and successful (i.e., the more educated a community, the more it will benefit; Chalmers & Bramadat, 1996; Kretzman & McKnight, 1993).

Social marketing is the design, implementation, and control of programs seeking to increase the acceptability of a social idea or practice in a target group. To maximize target group response, researchers use concepts of market segmentation, consumer research, idea configuration, communication, facilitation, incentives, and exchange theory (Walsh, Rudd, Moeykens, & Moloney, 1993). Successfully marketing ideas and behaviors in a social marketing campaign involves maximizing the four Ps—product, price, place, and promotion—by identifying the needs and wants of consumers. The roots of social marketing are found in the communication–persuasion matrix (McGuire, 1989). The underlying assumption of this theory is that people move through stages of exposure to postbehavioral consolidation in a conditional, sequential way. The persuasive context (e.g., source, messages) is assumed to allow for the questioning of the recipient's initial attitude, recommendation of the adoption of a new attitude, and provision of incentives (e.g., promises to reduce an unpleasant drive state such as fear) for attending

to, understanding, yielding to, and retaining the new attitude (Petty & Cacioppo, 1996).

Finally, policy is a commonly used tool for implementing public health change. Public health policy (not to be confused with health care policy) focuses on attaining a broad vision of health. Policy advocates search for ways to reduce disparities in health attainment through changes at the structural level (Reutter & Williamson, 2000; Wallack, Dorfman, Jernigan, & Themba, 1993).

COMBINING THE EXISTING MODELS INTO A FRAMEWORK

Key Commonalities Among the Models

Common themes emerged from our reviews and discussions of the various theories and models and their contents. Many of the individual models were quite specific and well defined. We identified the key variables. This makes testing the usefulness of such models in predicting behavior change easier. Many larger level models (e.g., community and ecological models) presented principles and assumptions about factors related to behavior change but did not have detailed, testable hypotheses or specified variables with predeveloped measurement tools. The complexity of these approaches makes it difficult to explain how community-level events result in individual change. The evidence for models varied widely. Although the model or theory may have been used in the intervention design, it was not usually tested to evaluate the delivery and receipt of intervention strategies or the changes in key model variables and the behavioral outcomes. Several models (e.g., the Health Belief Model) provide key variables that should be targeted in interventions and that should change along with the main outcome variables. Others (e.g., community organization) simply provide principles of operation that should be used when delivering the intervention. A few models and theories (e.g., Transtheoretical, Self-Regulation, and Diffusion of Innovations models; some ecological approaches) have begun to describe the process of behavior change; however, in general, the steps or processes of changing health behavior over time are not clearly researched. Almost no framework or model truly integrates individual and societal perspectives, and very little research tests this combination of variables. This is perhaps the largest gap in the existing literature.

Synthesis Among the Models

Our next step was to summarize the common and divergent elements of the theories and models reviewed. This summary is presented in Figure 3.1. For each variable we have noted in Figure 3.1 where *any* attention has been paid

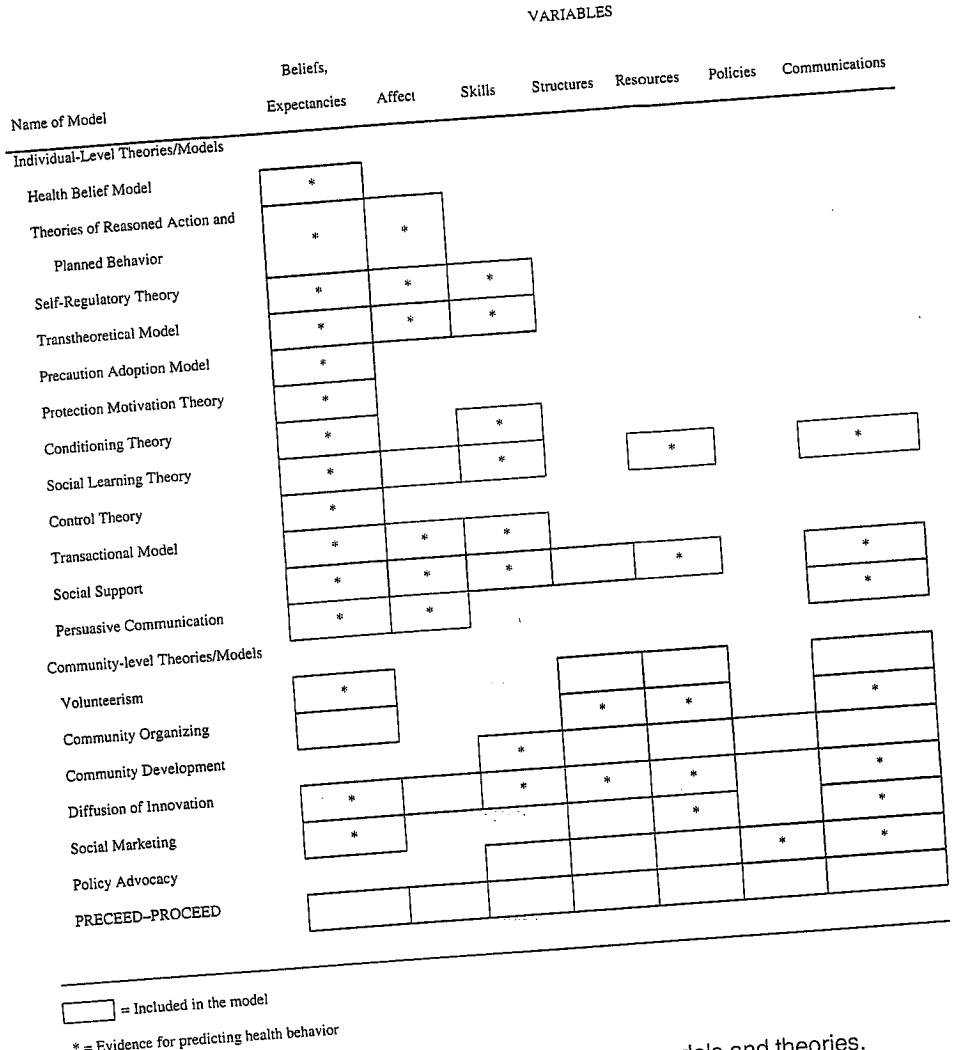


Figure 3.1. Common variables across health behavior models and theories.

to measuring the construct (indicated by a box) and where some evidence exists in the literature to support the construct (indicated by an asterisk in the appropriate box). Beliefs are probably the most researched construct (most of the individual-level models include beliefs as a key construct), but these beliefs are often defined differently. For example, beliefs are named in the Health Belief Model and in the Precaution Adoption Model; however, similar constructs in the Self-Regulation Model are called *mental representations*. The two cornerstones of Social Learning Theory, self-efficacy and outcome efficacy, have been added to other models. Intentions to perform a behavior, identified

through the theories of Reasoned Action and Planned Behavior, are very similar to a belief regarding one's future actions.

Both emotional and affective variables have been important in many models, including the Transtheoretical Model and the Transactional Model, and their relationship to each other and to health behavior outcomes needs to be better understood. Emotional or affective variables were proposed in four of the models we examined. Some models, such as the Transtheoretical Model, emphasize emotions as applied to specific issues, whereas the Transactional Model puts emphasis on general emotional reactions, such as anxiety or fear. The classic definition of *attitude*, central to much of social psychology, is a belief combined with a judgment of the importance of that belief, with that judgment being very similar to feeling or emotion.

Skills needed for behavior change include skills specific to the behavior as well as general skills to elicit social support, ask for help, and identify and use key coping strategies. Most of the models that explicitly identify skills as a component refer to them as *observable behaviors*. We define *cognitions* as skills and classify observations of these skills as collecting self-reported information. Cognitions are mutable under the same values and forces as are observable behaviors, thereby providing a method of changing beliefs.

We view constructs in the environmental-level theories as being organized around structures, resources, policies, and communications. *Structures* are the underlying systems within groups and organizations that facilitate or inhibit changes in health behavior. *Resources* are products within a system, community, or group that can be used to facilitate behavior change. Resources are necessary to ensure that the means for making changes are present in the environment and available to a substantial portion of the population. *Policies*, which correlate quite strongly with the social structures factor defined by Cohen et al. (2000), are rules and regulations at an organizational, community, or national level that make a behavior easier or more difficult to perform. Policies are both formal and informal. *Communications* are the processes whereby other aspects of the environment are made known to communities, organizations, and individuals. This term can refer to notifying a group regarding healthy behavior policies, appropriate structures for assistance in adopting a healthy behavior, or availability of resources. The importance of communication is recognized by the community organization approach, diffusion of innovations, social marketing, and policy advocacy views.

Figure 3.2 illustrates a framework that combines concepts from all the models and theories we identified and reviewed. There are two categories of critical variables identified within the framework: personal variables, which focus on individuals' ideas and thoughts, and environmental variables, which address the social setting within which people live. We assumed that some common influence among these variables existed, but identification of these kinds of correlations must wait for a full test of the framework.

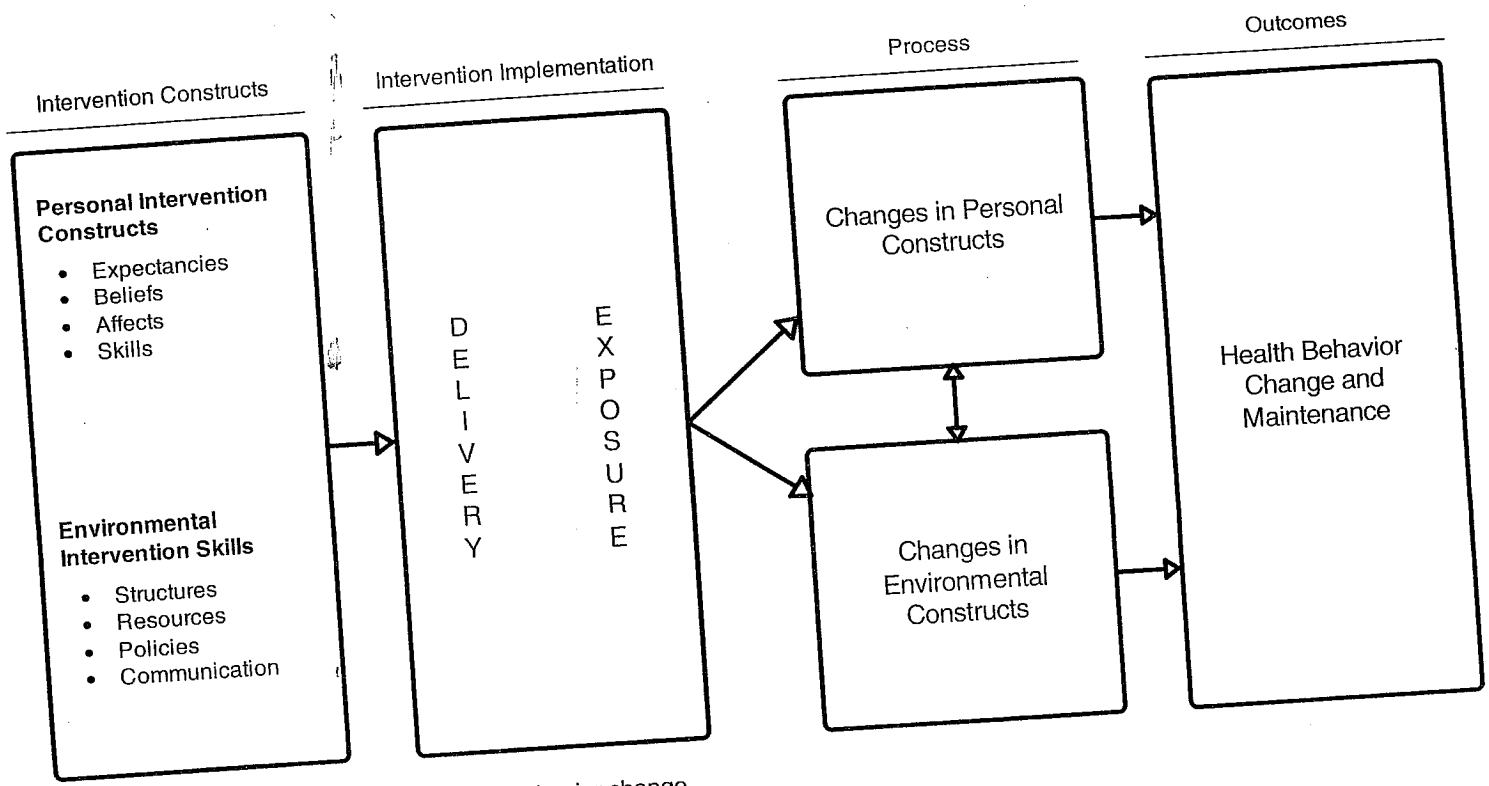


Figure 3.2. Potential framework for health behavior change.

Any intervention must be implemented to have an effect, and efforts have been made to define the process of implementation (Lichstein, Riedel, & Grieve, 1994). Here, we divided implementation into two parts, each measurable within the context of intervention research: (a) delivery (i.e., the intervention strategies must be delivered to the target population) and (b) exposure (i.e., the target population must be exposed to the strategies). Delivery can often be measured simply by counts of material sent, number of hours of contact time, interventionists' logbooks or other record keeping, or direct observations of content delivered. Delivery, however, is only a part of implementation. People must be exposed to the delivered intervention elements for them to produce an effect. Like delivery, exposure can be measured in multiple ways, such as by counting the number of people at events or actions resulting from the delivery of an intervention material or by simply asking target individuals whether they have seen or been part of intervention strategies. Then, of course, the intervention must be enacted or engaged by the target audience to have effect (Lichstein et al., 1994).

Finally, after intervention strategies have been delivered and exposure has occurred, we assume that key framework variables will change. Those changes will result in changes in the desired health behavior. The order in which these variables change, the importance of each variable in predicting outcome, and the relationships among intervention delivery and exposure and change in key framework variables are probably the least researched topics in this field. They are currently unknown for the framework we propose. This type of research, conducted using appropriate statistical techniques, should be a key part of every research project on health behavior interventions.

TAKING THE NEXT STEP

The next step in our systematic plan for developing a framework of health behavior change is to look for causal relationships among the variables in our current framework in an intervention setting. The variables identified from the literature have relationships between and among each other, and they need to be applied to a specific intervention and behavioral goal to be useful. Interventions occur at the individual level, the group or community level, or both, and the causal variables will likely interact to produce health behavior change (Emmons, 2000). In fact, the synergy of multiple components and levels of intervention is often assumed to produce successful change, although this is rarely tested.

This testing will allow us to identify and test specific hypotheses regarding the variables chosen for the initial framework. We will be able to confirm or disconfirm the usefulness of specific variables within constructs or, indeed, of entire constructs within the framework. This process will be laborious and

will require application of the framework to multiple intervention settings. Several beliefs related to the specific health behavior would be measured both pre- and postintervention delivery. Each of those beliefs should change as a result of the intervention. Further, if we apply this framework we would hypothesize that the change in beliefs would predict change in health behavior. If change in only some of the beliefs predicts change in behavior, then the evidence for including those beliefs in the behavior-specific version of the framework is strengthened. If none of the beliefs predicts change in health behavior, then the evidence for including them as an important construct in the emerging framework is weakened. Finally, on the basis of previous research, we hypothesize that change in beliefs is related to change over time in specific resources that are intended to alter important beliefs, which then leads to a change in health behavior outcomes. Specific causal chains can and should be proposed a priori and tested as part of intervention evaluation and model building. A similar approach can be taken in assessing the influence of environmental factors. It will be important to understand, for instance, whether structures exist in communities to facilitate change. For example, if a number of studies indicate that specific health behavior change occurs even without an infrastructure to support such changes, the structural factor may not be a requirement for a comprehensive intervention.

Indeed, the process of changing health behavior is an understudied phenomenon in general. The analysis of interrelationships among the variables in this framework and their relative importance in any given behavior change setting is probably the most important aspect of our next step of applying the framework to intervention settings.

REFERENCES

Aarts, H., Paulussen, T., & Schaalma, H. (1997). Physical exercise habit: On the conceptualization and formation of habitual health behaviours. *Health Education Research, 12*, 363–374.

Abrams, D. B., Emmons, K. M., & Linnan, L. A. (1997). Health behavior and health education: The past, present, and future. In K. Glanz, F. M. Lewis, & B. K. Rimer (Eds.), *Health behavior and health education: Theory, research, and practice* (2nd ed., pp. 453–478). San Francisco: Jossey-Bass.

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*, 179–211.

Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behavior.* Englewood Cliffs, NJ: Prentice Hall.

Ajzen, I., & Madden, T. J. (1986). Prediction of goal-directed behavior: Attitudes, intention, and perceived behavioral control. *Journal of Experimental and Social Psychology, 22*, 453–474.

Bandura, A. (1986). *Social foundations of thought and action: A social-cognitive theory*. Englewood Cliffs, NJ: Prentice Hall.

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: Freeman.

Carrell, D. S., Johnson, C. L., Stanley, L. C., Thompson, J., & Tosti, S. (1995). *Changing public policy around tobacco control in the COMMIT communities. Community-based interventions for smokers: The COMMIT experience*. Bethesda, MD: U.S. Department of Health and Human Services.

Chalmers, K. I., & Bramadat, I. J. (1996). Community development: Theoretical and practical issues for community health nursing in Canada. *Journal of Advanced Nursing, 24*, 719–726.

Cohen, D. A., Scribner, R. A., & Farley, T. A. (2000). A structural model of health behavior: A pragmatic approach to explain and influence health behaviors at the population level. *Preventive Medicine, 30*, 146–154.

Emmons, K. M. (2000). Behavioral and social science contributions to the health of adults in the United States. In B. D. Smedley & L. S. Syme (Eds.), *Promoting health: Intervention strategies from social and behavioral research* (pp. 254–321). Washington, DC: National Academies Press.

Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention, and behavior: An introduction to theory and research*. Reading, MA: Addison Wesley.

Kretzman, J., & McKnight, J. (1993). *Building communities from the inside out: A path toward finding and mobilizing a community's assets*. Evanston, IL: The Asset-Based Community Development Institute, Institute for Policy Research.

Lazarus, R. S. (1991). Progress on a cognitive–motivational–relational theory of emotion. *American Psychologist, 46*, 819–834.

Lazarus, R. S. (1993). Coping theory and research: Past, present, and future. *Psychosomatic Medicine, 55*, 234–247.

Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal, and coping*. New York: Springer Publishing Company.

Leventhal, H., & Cameron, L. (1987). Behavioral theories and the problem of compliance. *Patient Education and Counseling, 10*, 117–138.

Leventhal, H., Diefenbach, M. A., & Leventhal, E. A. (1992). Illness cognition: Using common sense to understand treatment adherence and affect cognition interactions. *Cognitive Therapy and Research, 16*, 143–163.

Lichstein, K. L., Riedel, B. W., & Grieve, R. (1994). Fair tests of clinical trials: A treatment implementation model. *Advances in Behavioral Research Therapy, 16*, 1–29.

McGuire, W. (1989). Theoretical foundations of campaigns. In R. E. Rice & C. K. Atkin (Eds.), *Public communication campaigns* (2nd ed., pp. 43–65). Newbury Park, CA: Sage.

McLeroy, K. R., Bibeau, D., Steckler, A., & Glanz, K. (1988). An ecological perspective on health promotion programs. *Health Education Quarterly, 15*, 351–377.

Miller, S. M., Fang, C. Y., Manne, S. L., Engstrom, P. E., & Daly, M. B. (1999). Decision making about prophylactic oophorectomy among at-risk women: Psychological influences and implications. *Gynecologic Oncology, 75*, 406–412.

Miller, S. M., Shoda, Y., & Hurley, K. (1996). Applying cognitive-social theory to health-protective behavior: Breast self-examination in cancer screening. *Psychological Bulletin, 119*, 70–94.

Minkler, M., & Wallerstein, N. (1997). Improving health through community organization and community building. In K. Glanz, F. M. Lewis, & B. K. Rimer (Eds.), *Health behavior and health education: Theory, research, and practice* (2nd ed., pp. 241–269). San Francisco: Jossey-Bass.

National Cancer Institute. (1991). *Assist program guidelines for tobacco-free communities*. Rockville, MD: Author.

Pascale, R. W., Wing, R. R., Butler, B. A., Mullen, M., & Bonomi, P. (1995). Effects of a behavioral weight loss program stressing calorie restriction versus calorie plus fat restriction in obese individuals with NIDDM or a family history of diabetes. *Diabetes Care, 18*, 1241–1248.

Pertschuk, M., & Shopland, D. R. (1989). *Major local smoking ordinances in the United States* (NIH Publication No. 90-479). Washington, DC: U.S. Department of Health and Human Services.

Petty, R. E., & Cacioppo, J. T. (1996). The message learning approach. In R. E. Petty & J. T. Cacioppo (Eds.), *Attitudes and persuasion: Classic and contemporary approaches* (pp. 59–94). Boulder, CO: Westview Press.

Prochaska, J. O., & DiClemente, C. C. (1982). Transtheoretical therapy: Toward a more integrative model of change. *Psychotherapy: Theory and Practice, 19*, 266–288.

Prochaska, J. O., & DiClemente, C. C. (1983). Stages and processes of self-change of smoking: Toward an integrative model of change. *Journal of Consulting and Clinical Psychology, 51*, 390–395.

Redmon, J. B., Raatz, S. K., Kwong, C. A., Swanson, J. E., Thomas, W., & Bantle, J. P. (1999). Pharmacologic induction of weight loss to treat Type 2 diabetes. *Diabetes Care, 22*, 896–903.

Reutter, L., & Williamson, D. L. (2000). Advocating healthy public policy: Implications for baccalaureate nursing education. *Journal of Nursing Education, 39*, 21–26.

Rogers, E. M. (1995). *Diffusion of innovations* (4th ed.). New York: Free Press.

Rogers, R. W., & Mewborn, C. R. (1976). Fear appeals and attitude change: Effects of a threat's noxiousness, probability of occurrence, and the efficacy of coping responses. *Journal of Personal and Social Psychology, 34*, 54–61.

Rothman, J. (1979). Three models of community organization practice. In F. M. Cox (Ed.), *Strategies of community organization: A book of readings* (3rd ed., pp. 86–102). Itasca, IL: F. E. Peacock.

Rothman, J. (1996). The interweaving of community intervention approaches. In M. Weil (Ed.), *Community practice: Conceptual models* (pp. 69–99). New York: Haworth Press.

Salonen, J. T., Puska, P., Kottke, T. E., & Tuomilehto, J. (1981). Changes in smoking, serum cholesterol, and blood pressure levels during a community-based cardiovascular disease prevention program—The North Karelia Project. *American Journal of Epidemiology, 114*, 81–94.

Stokols, D. (1992). Establishing and maintaining healthy environments. Toward a social ecology of health promotion. *American Psychologist, 47,* 6–22.

Thompson, B., & Kinne, S. (1998). Social change theory: Applications to community health. In N. F. Bracht (Ed.), *Health promotion at the community level* (2nd ed., pp. 29–46). Thousand Oaks, CA: Sage.

Thompson, B., Nettekoven, L., Ferster, D., Stanley, L. C., Thompson, J., & Corbett, K. K. (1995). *Mobilizing the COMMIT communities for smoking control community-based interventions for smokers: The COMMIT experience.* Bethesda, MD: U.S. Department of Health and Human Services.

Van Willigan, J. (1976). Applied anthropology and community development administration: A critical assessment. *Southern Anthropological Society Proceedings, 10,* 81–91.

Wallack, L., Dorfman, L., Jernigan, D., & Themba, M. (1993). *Media advocacy and public: Power for prevention.* Newbury Park, CA: Sage.

Walsh, D. C., Rudd, R. E., Moeykens, B. A., & Moloney, T. W. (1993). Social marketing for public health. *Health Affairs, 12,* 104–119.

Weiner, B. (1995). *Judgments of responsibility: A foundation for a theory of social conduct.* New York: Guilford Press.

Weinstein, N. D. (1993). Testing four competing theories of health-protective behavior. *Health Psychology, 12,* 324–333.